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TSSG/APSD/IEB-081/70  
10 June 1970

MEMORANDUM FOR THE RECORD

SUBJECT: Implementation of the "Operational Handbook for Evaluation of Original Negative"

I. PROBLEM

A. Background

The "Handbook" was delivered to APSD in December of 1969. The need for such a handbook exists for several reasons. Among these are the standardization and systemizing of evaluation procedures and criteria. The Handbook covers the entire area of image evaluation from the photographic quality to the metric quality. These areas are theoretically explored in the Handbook; therefore, each needs to be explored, one at a time, to ascertain its worth and refined when possible.

B. Study

With these thoughts, I surveyed the Handbook. The following is an outline of that survey with an indication of the areas to be covered and an estimate of the time efforts required to accomplish the task. A partial implementation approach was used to simplify the initial task.

II. TASK: The task to be investigated is the partial implementation of the Info Tech "Operational Handbook for Evaluation of Original Negative." The part of the "Dupe Performance Summary" relative to tonal criteria shall be that part.

A. Assumptions

1. The basic plan and concept of statistically analyzing objective data relative to mission performance is sound.
2. The initial interest is in implementing part of the overall evaluation plan. The Dupe Performance Summary is of most interest since the criteria for that portion is most understood and is relative to many of the evaluation problems currently needing to be solved.

GROUP 1  
Excluded from automatic  
downgrading and  
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3. The evaluation in some cases evolves through the use of certain historical data not necessarily available initially, since it is of a historical nature. In such cases, the data being used and generated will be considered as that historical data or theoretically perfect data and therefore, in such cases, complete correlation will exist.

4. The initial targets to be **evaluated** will be CORN targets acquired with the  system. These will supply the most complete set of data and permit the most ridged examination of the results.

5. A minimum of two acquisitions must be considered to permit an analysis. Without two sets of data, no comparisons can be made.

6. Later experimentation and implementation of the more questionable techniques as well as a careful reexamination of the original criteria would be conducted to optimize the overall plan.

B. Procedure

1. By Computer: To implement part of the evaluation by computer, certain programming decisions must be made and implemented. These include the allocation of file space and the establishment of the files to contain the data, the acquisition of the data and its' formatting for the files, and ultimately, the application of the evaluation subroutines against the data. The evaluation subroutines within themselves are relatively simple programs that can be done one at a time. However, to commit data to these files is the major task to be accomplished. The data for them is at least partially available currently from sources such as our Division files, Project Sunny and the Westover PET trace data.

2. Manually: To implement the plan manually, the same basic steps would have to be followed. Although the initial commitment is somewhat less since the computer files would not be needed. The overall effort would become significant. Each new piece of data would require the same effort, instead of the routine data processing procedures established with a computer program.

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C. Alternative

1. The rejection of the "Operational Handbook for Evaluation of Original Negative" merely forestalls indefinitely the decision to use a set of objective criteria for the evaluation of original negatives. As personal and volumes of work increase, the only effective way to be consistent is through previously established criteria.

2. An important point to be made is that the evaluation plan is flexible enough to allow the use of different criteria as they become evident while maintaining the basic plan and program.

D. Survey

1. Chart I consists of the collection and computation of data for specific targets by ID number and the establishment of files for the storage of the computed data. The following will outline the chart by individual stage, describe it and predict the effort required to establish it by computer and calculator techniques. Only those blocks relative to tonal criteria will be examined.

Each block is analyzed in the following manner:

- a. The data necessary to conduct analysis
- b. The availability of the necessary data
- c. The formula source for calculation
- d. The times required by two methods (i computer, and ii calculator) to
  - (1) gather data
  - (2) compute data
  - (3) file data

Also given will be the block number of the source if from within the plan and a page reference for each block under examination.

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
10	10	Initial start
147	14	a) 1 - Optimum density, standard target reflectance 2 - Illumination 3 - Exposure 4 - "T" stop 5 - Atmospheric term 6 - E vs D curve b) 1 - CORN data book and illumination data to get optimum res vs log E 2 - Given by report pp 176 or use SOC model 3 - MCD 4 - MCD 5 - Block 17 pp 155 6 - Use 1 above for standard target i    ii d) 1 - 1    1 2 - 4    4 3 - 1    1 c) Report on page 147
150	14a	a) Exposure error of Block 14 b) Block 14 pp 147

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>	
		i	ii
		d)	
		1 - -	-
		2 - 4	3
		3 - 1	1
		c) Standard statistical technique	
155	17	a) 1 - Tone trace	
		2 - Sensitometric curve	
		b) 1 - PET book	
		2 - Processing report	
		d) i ii	
		1 - -	-
		2 - 3	1
		3 - 1	1
26	23	c) Report on page 155-156	
158	159	a) 1 - Statistical target data	
		2 - Illumination	
		3 - Additive term	
		b) 1 - Given block 144 pp 147	
		2 - Given in report pp 176 or SOC	
		3 - Given block 17 or pp 177	
		d) i ii	
		1 - -	-

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		i ii
		2 - 2 2
28	25	3 - 1 1
		c) Report on pp 158
159	19a	a) Standard target modulation
		b) Given block 19 pp 158
		d) i ii
		1 - - "
		2 - .1 1
		3 - - "
		c) Standard Statistical technique
160	21	a) 1 - Background exposure
		2 - E vs D curve
		3 - "T" stop
		4 - Exposure time
		5 - Illumination
		b) 1 - Given block 17 pp 155
		2 - Processing report
		3 - MCD
		4 - MCD
		5 - Given in report pp 176 or SOC

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		d) i ii
		1 - 5 5
		2 - 4 2
33	29	3 - 1 1
		c) Report pp 160-161
162	21a	a) Tonal curve
		b) Given block 21 pp 160
		c) Report page 162
		d) i ii
		1 - .1 .1
		2 - 3 2
37	32	3 - 1 1
163	22	a) 1 - Reflective vs exposure ideal
		2 - Additive exposure curve
		3 - "T" stop
		4 - Exposure time
		5 - Illumination
		6 - E vs D curve
		b) 1 - CORN data book and ideal exposure (block 14)
		2 - Given block 17, pp 155

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		3 - MCD
		4 - MCD
		5 - Given block 27, pp 175
		6 - Processing report
		c) Given pp 163
		d) i ii
		1 - 1 1
		2 - 4 3
42	36	3 - 1 -
164	22A	a) High and low reflective densities
		b) Given block 22, pp 163
		c) Standard statistical techniques
		d) i ii
		1 -.1 .1
42	37	2 - .1 .1
		3 - - -
165	23	a) 1-High and low reflections
		2 - Standard target data
		3 - Sensitometric data
		4 - Illumination
		5 - "T" stop
		6 - Exposure time



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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		7 - Background exposure
	b)	1 - Given block
		2 - CORN data and illumination mode, pp 147, block 14
		3 - Processing report
		4 - Illumination model
		5 - MCD
		6 - MCD
		7 - Given block 17, pp 155
	c)	Given pp 165-166
	d)	i ii
		1 - .1 .1
		2 - 4 3
47	40	3 - 1 -
167	23a	a) High and low reflective gamma
		b) Given block 23, pp 165
		c) Standard statistical technique
	d)	i ii
		1 - .1 .1
47	41	2 - .1 1
		3 - - -
168	25	a) Same as for block 14
		b) Same as for block 14
		c) Given pp 168-170

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		d) i ii
		1 - - -
		2 - 2 1
50	42	3 - 1 -
171	25a	a) average gamma of reflective
		b) given block 25, pp 168
		c) Standard statistical technique
		d) i ii
		1 - .1 .1
50	43	2 - .1 1
		3 - - -
172	26	a) 1 - Additive absolute exposure
		2 - Sensitometric data
		b) 1 - given block 17, pp 155
		2 - Processing report
		c) Given pp 172-173
		d) i ii
		1 - .1 .1
54	45	2 - 3 2
		3 - 1 -

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
174	26	a) Tonal curves b) Given block 26, pp 172 c) Given pp 174 d) i ii 1 - .1 .1
47	48	2 - 2 2 3 - 1 1
175	27	a) Illumination vs sun angle b) Given in report pp 176 plus site manning report c) Given pp 175-176 d) i ii 1 - .1 .1
62	50	2 - 3 1 3 - 2 1

## 2. CHART III

Chart III consists of a comparison of targets within a mission and between missions. Only blocks 1 thru 4 are treated service others of Chart III are at least partially, spatially related. As previously, each stage is given, the input listed and the sources and efforts described.

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
62	50	
210	1	a) 1 - Percentile ON tonal curves 2 - Density vs log reflectance 3 - Standard dupe curve 4 - Average $\bar{R}$ b) 1 - Mission summary file 2 - Missions summary file 3 - Standard data file 4 - Standard data file c) Given pp 213, 214 d) i ii 1 - - 1 2 - 5 3 68 54 3 - 1 - 215 2 a) 1 - Percentile ON tone curve 2 - D vs Log E 3 - Average target log E for $\bar{R}$ 4 - Standard Dupe curve b) 1 - Mission Summary file 2 - Mission Summary file 3 - Mission Summary File 4 - Mission Summary File

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<u>PAGE</u>	<u>BLOCK</u>	<u>ANALYSIS</u>
		c) Similar to that for block 1, description given pp 215
		d) i ii
		1 - - 1
71	57	2 - 2 2
		3 - 1 -
217	3	a) Dupe density vs log R
		b) Given block 1 pp 210
		c) given pp 217-218
		d) i ii
		1 - - 1
		2 - 4 2
75	60	3 - 1 -
219	4	a) Dupe density vs Log e (ON)
		b) given block 3 pp 217
		c) given pp 219-220
		d) i ii
		1 - - 1
79	63	2 - 3 2
		3 - 1 -

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### III. SUMMARY

A. A summary of the times required to accomplish the preceeding tasks is listed below.

<u>TASK</u>	<u>BY</u>	<u>DAYS/WEEK</u>
1st time		
-computer		79/16
-manually		63/13
2nd time		
- computer		1/ 2
- manually		15/ 3

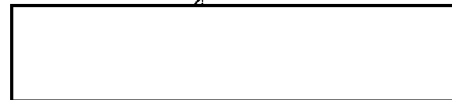
It is assumed that at least a second time through will be necessary to validate the methodology.

B. After this objective effort, a manual analysis of the data will be necessary. The Handbook does not describe this plan and therefore it is not examined. It could consist of a simple listing of the data or perhaps a graph of parameters against each other.

C. No direct consideration was given for such factors as learning curves, necessary training to be familiar with the terminology, currently available statistical programs, or computer availability.

### IV. COMMENTS

As with any scientific experiment, which the Handbook implementation would be, there are bound to be unforeseen changes called for and not predictable. However, after such an exercise as described, APSD would be in a better position than anyone else in the Community to apply objective criteria to Original Negative evaluations.



Section II  
Image Evaluation Branch  
APSD/TSSG/NPIC

#### Distribution:

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NOTE: Ann - Please correct and file in 920083